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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,115	03/08/2005	Hans Lobl	DE 020206	9528
65913	7590	11/25/2009	EXAMINER	
NXP, B.V. NXP INTELLECTUAL PROPERTY & LICENSING M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131			NADAV, ORI	
			ART UNIT	PAPER NUMBER
			2811	
			NOTIFICATION DATE	DELIVERY MODE
			11/25/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary

Application No.

10/527,115

Applicant(s)

LOBL ET AL.

Examiner

Ori Nadav

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-25 is/are pending in the application.
- 4a) Of the above claim(s) 6 and 13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-12 and 14-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 11-12, 14 and 25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support in the elected embodiment of new figure 1 for an absorbing layer, as recited in claims 11-12, 14 and 25.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 7-8, 11-12, 14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Nishihara et al. (6,734,763).

Nishihara et al. teach in figure 21 and related text a bulk acoustic wave (BAW) resonator comprising:

- a top electrode 823;

- a piezoelectric layer 822 disposed adjacent to the top electrode;

- a bottom electrode 821 disposed adjacent to the piezoelectric layer, wherein the bottom electrode is disposed opposite the top electrode relative to the piezoelectric layer; and

- a substrate 810 disposed opposite the piezoelectric layer relative to the bottom electrode, wherein the substrate comprises an uneven surface (column 3, lines 6-7) to suppress a spurious mode (inherently therein), wherein

- the uneven surface is on a rear side of the substrate facing away from the bottom electrode, and

- the uneven surface of the substrate comprises an absorbing layer 830, 840 disposed on the substrate to absorb the spurious mode, wherein

- the absorbing layer is disposed on a front side of the substrate, between the substrate and the bottom electrode, wherein

- the absorbing layer comprises at least one acoustic absorbing material of a plurality of acoustic absorbing materials, wherein the plurality of acoustic absorbing materials comprises epoxy glue, an elasticoviscous material, rubber, silicon rubber, a plastic material, a porous media, and a porous thin film, and wherein:

- the top electrode comprises a first metal material; the piezoelectric layer comprises at

least one of a plurality of piezoelectric material; and the bottom electrode comprises a second metal material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-8, 11-12, 14, 16-19 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara et al. (6,734,763).

Regarding claims 7-8, 11-12, 14 and 16, Nishihara et al. teach in figure 21 and related text a bulk acoustic wave (BAW) resonator comprising:

a top electrode 823;

a piezoelectric layer 822 disposed adjacent to the top electrode;

a bottom electrode 821 disposed adjacent to the piezoelectric layer, wherein the bottom electrode is disposed opposite the top electrode relative to the piezoelectric layer; and

a substrate 810 disposed opposite the piezoelectric layer relative to the bottom electrode, wherein the substrate comprises an uneven surface (column 3, lines 6-7) to suppress a spurious mode (inherently therein since it has an uneven surface), wherein

the uneven surface of the substrate comprises an absorbing layer 830, 840 disposed on the substrate to absorb the spurious mode, wherein

the absorbing layer is disposed on a front side of the substrate, between the substrate and the bottom electrode, wherein

the absorbing layer comprises at least one acoustic absorbing material of a plurality of acoustic absorbing materials, wherein the plurality of acoustic absorbing materials comprises epoxy glue, an elasticoviscous material, rubber, silicon rubber, a plastic material, a porous media, and a porous thin film, and wherein:

the top electrode comprises a first metal material; the piezoelectric layer comprises at least one of a plurality of piezoelectric material; and the bottom electrode comprises a second metal material.

Nishihara et al. do not explicitly state that the substrate has an uneven surface, wherein the uneven surface is on a rear side of the substrate facing away from the bottom electrode.

Nishihara et al. teach in column 3, lines 6-7 that the surface roughness of a sacrifice layer is greater than that of the substrate.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a substrate with an uneven surface, wherein the uneven surface is on a rear side of the substrate facing away from the bottom electrode in Nishihara et al.'s device in order to form the device as understood by Nishihara et al.'s teachings, and in order to improve the device characteristics by improving the adhesion

between the substrate and the device structure (by having the uneven surface on a rear side of the substrate), respectively.

Note that forming the uneven surface on a back side or rear side of the substrate facing away from the bottom electrode, does not necessarily mean that the "rear side" of the substrate is the side which is not attached to any other layer, because both sides of the substrate are "facing away from or opposite the bottom electrode".

Regarding claims 17-19, Nishihara et al. do not state in the embodiment of figure 21 and related text substantially the entire claimed structure, as applied to the claims above, except the first metal material of the top electrode comprises aluminum (Al), wherein the plurality of piezoelectric materials comprises aluminum nitride (AlN), zinc oxide (ZnO), and lead zirconate titanate (PZT), and wherein the second metal material of the bottom of electrode comprises molybdenum (Mo), platinum (Pt), or tungsten (W). Nishihara et al. teach in column 4 a first metal material of the top electrode comprises aluminum (Al), wherein the plurality of piezoelectric materials comprises aluminum nitride (AlN), zinc oxide (ZnO), and lead zirconate titanate (PZT), and wherein the second metal material of the bottom of electrode comprises molybdenum (Mo), platinum (Pt), or tungsten (W).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the first metal material of the top electrode comprises aluminum (Al), wherein the plurality of piezoelectric materials comprises aluminum nitride (AlN), zinc oxide (ZnO), and lead zirconate titanate (PZT), and wherein the

second metal material of the bottom of electrode comprises molybdenum (Mo), platinum (Pt), or tungsten (W), in Nishihara et al.'s device, in order to reduce to cost of the device by using conventional materials for the top electrode, the plurality of piezoelectric materials and for the bottom of electrode.

Regarding claims 20-21 and 23-25, Nishihara et al. teach in figure 21 and related text substantially the entire claimed structure, as applied to the claims above, including a first BAW resonator to suppress a pass-band ripple of a spurious mode, wherein the BAW resonator comprising a substrate with an uneven surface to suppress a spurious mode.

Nishihara et al. do not teach in the embodiment of figure 21 a second BAW resonator connected to the first BAW resonator, wherein the second BAW resonator is used to suppress the pass-band ripple of a spurious mode.

Nishihara et al. teach a second BAW resonator connected in a ladder configuration to the first BAW resonator (column 1, lines 45-48).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to connect a second BAW resonator to suppress the pass-band ripple of a spurious mode in a ladder configuration to the first BAW resonator in Nishihara et al.'s device, in order to improve the filtering characteristics of the device when it is used in a filter application.

Regarding claim 22, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to connect the second BAW resonator in a lattice configuration to the first BAW resonator in Nishihara et al.'s device, in order to use the device in a filter application which require lattice configuration.

Claims 9-10 and 15, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara et al. in view of Kobrin et al. (5,936,150).

Regarding claims 9-10, Nishihara et al. teach in figure 21 and related text substantially the entire claimed structure, as applied to the claims above, the roughened surface of the substrate comprises an etched surface of glass and a blasted layer of glass.

Kobrin et al. teach in figure 3 and related text a substrate 12 comprises an etched surface of glass and a blasted layer of glass.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a glass substrate in Nishihara et al.'s device, in order to use the device in an application which require insulating substrate.

Regarding the process limitations recited in claims 9 and 10 ("an etched surface of glass and a blasted layer of glass"), these would not carry patentable weight in this claim drawn to a structure, because distinct structure is not necessarily produced. Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this

issue); and In re Marosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in product by process claims or not. Note that the applicant has the burden of proof in such cases, as the above case law makes clear.

Regarding claim 15, Nishihara et al. do not teach a Bragg reflector disposed between the substrate and the bottom electrode.

Kobrin et al. teach in figure 3 and related text a Bragg reflector disposed between the substrate and the bottom electrode.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a Bragg reflector disposed between the substrate and the bottom electrode in Nishihara et al.'s device, in order to use the device in an application which require reflecting layers.

Response to Arguments

1. Applicant argues that there is support in the embodiment of figure 1 for the limitation of "the absorbing layer" as recited in claims 11, 12, 14, and 25, because "35 U.S.C. 112, first paragraph, does not provide any basis for the present rejection because 35 U.S.C. 112, first paragraph, does not require that the subject matter of

claims 11, 12, 14, and 25 have "support in the elected embodiment." Moreover, the subject matter of each of claims 11, 12, 14, and 25 qualifies as a sub-species of the embodiment shown in Fig. 1. Although the subject matter illustrated in Fig. 1 does not explicitly include an absorbing layer, there is no requirement that sub-species of the elected species cannot include additional features".

The examiner fails to understand what applicant means by stating that "the subject matter of each of claims 11, 12, 14, and 25 qualifies as a sub-species of the embodiment shown in Fig. 1". The examiner respectfully requests applicant to state whether the limitations recited in claims 11, 12, 14 and 25 are different species or do they belong to the device of figure 1. The examiner further requests applicant to explain how the claimed limitations recited in claims 11, 12, 14 and 25 should be included in the device of figure 1. Please note that all the claimed subject matter must be depicted in the drawings. Therefore, applicant is required to include said limitations in the drawings.

2. Applicant argues that there is inconsistency regarding the rejections of claim 7, because "claim 7 was rejected under 35 U.S.C. 102(e) as being anticipated by Nishihara" but the Office Action also rejects claim 7 under 35 U.S.C. 103(a) as unpatentable over Nishihara, "with the recognition that Nishihara does not disclose all of the limitations of the claim". Applicant further argues that "It appears that these

rejections of claim 7 under 35 U.S.C. 102(e) and 103(a) contradict each other. Therefore, it stands that one of the above rejections is improper”.

Claim 7 was rejected under 35 U.S.C. 102(e) as being anticipated by Nishihara, because Nishihara et al. teach an uneven surface of the substrate. By broadly interpreting claim 7, the recitation of “the uneven surface is on a rear side of the substrate facing away from the bottom electrode” does not have to mean that the uneven surface of the substrate is the side of the substrate which is not attached to any other layer. Therefore, claim 7 is anticipated by Nishihara et al.

On the other hand, if the broad interpretation of the claim as suggested by the examiner is not acceptable, and it does not mean that the uneven surface of the substrate can be the side of the substrate which is attached to other layers, then claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara et al.

In other words, although Nishihara et al. teach an uneven surface of the substrate, Nishihara et al. do not teach that the uneven surface of the substrate is located on the side of the substrate which is not attached to any other layer. Therefore, the rejections of claim 7 under 35 U.S.C. 102(e) and 103(a) do not contradict each other, and none of the above rejections is improper.

3. Applicant argues that Nishihara et al. do not teach that the uneven surface is on a rear side of the substrate facing away from the bottom electrode.

The examiner could not find any definition for the phrase "facing away" which is different from the term "opposite". Therefore, the recitation of "the uneven surface is on a rear side of the substrate facing away from [or opposite] the bottom electrode" **does not have to** mean that the uneven surface of the substrate is the side of the substrate which is not attached to any other layer. Looking at and considering the substrate from the side which is not attached to any other layer renders said side as the "front side", and the other side of the substrate as the "rear side of the substrate". That is, the rear side of the substrate can be arbitrarily chosen as the side which is not the "front side".

The examiner, however, agrees that the claims will not be anticipated by Nishihara et al. if the claims recite that the uneven surface of the substrate is the surface which is not directly connected to the Bragg layer of the claimed structure or is not directly connected to any layer of the claimed structure.

4. Applicant argues that "in order to implement the modification suggested by the Examiner, the description of Nishihara would have to be augmented to include an additional process step to make the surface uneven on a rear side of the substrate. Adding an additional process step to the description of Nishihara in order to implemented the modification, as suggested by the Examiner, would not "simplify the processing steps of making the device," but rather would make the processing steps more complex by addition additional processing steps".

An artisan would be motivated to use a substrate with an uneven surface, wherein the uneven surface is on a rear side of the substrate facing away from the bottom electrode in Nishihara et al.'s device in order to improve the device characteristics by improving the adhesion between the substrate and the device structure by having the uneven surface on a rear side of the substrate and by adhering the smooth surface of the substrate to the semiconductor layer.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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11/23/2009

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